# “Productivity in the UK 5: Benchmarking UK Productivity Performance”

# Intellect Response to the HM Treasury and the Department of Trade and Industry Consultation

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## Productivity in the UK 5: Benchmarking UK Productivity Performance
**A consultation on productivity indicators**

## Introduction

This submission has been prepared by Intellect, the trade organisation representing the UK's information technology, telecommunications and electronics industries, in response to the HM Treasury and Department of Trade and Industry consultation "Productivity in the UK 5: Benchmarking the UK Productivity Performance".

Intellect welcomes the opportunity to take part in this consultation. Intellect's response has focused on two main areas:

- The role of ICT within productivity
- Comments on criteria and methodology for selecting the set of indicators

Intellect strongly raises concerns on the lack of indicators measuring the contribution of ICT to productivity within the consultation document. None of the proposed national indicators (**Page 8 Box 2**) relate directly to ICT development or take up.

The OECD states "ICT continues to be an important driver for growth provided the right conditions for growth and innovation are in place" [Seizing the Benefits for ICT in a Digital Economy OECD 2003]. It cites three main areas in which ICT affects economic growth: Through production, through investment and through increased efficiency and innovation.

ICT is an important element in total factor productivity (tfp) and a key General Purpose Technology (GPT) effecting productivity in all areas. Implementation, take up and successful exploitation of ICT is key to UK's aim to raise productivity and bridge the gap between competing nations.

Intellect therefore recommends that the productivity indicators contain a set of measures to ascertain UK's progress in implementation, take up and successful exploitation of ICT over and above the indicators contained within the consultation paper.

In addition, Intellect specifically recommends a revision of the indicators to ensure that infrastructure criteria includes communications infrastructure

## 1. The role of ICT within productivity

The consultation document "Productivity in the UK 5: Benchmarking UK productivity performance" refers throughout to technology in relation to productivity, showing recognition of the key impact ICT has on productivity. The references identified by Intellect can be found in Annex A.

Despite these numerous references to the impact ICT has on productivity, there are no indicators put forward to measure ICT's effect on productivity.

ICT investment should be recognised as a significant productivity booster as it improves the capital intensity levels in the economy (shown to be a significant driver for the productivity gap with the US, France and Germany). In addition, ICT investment also addresses the tfp portion of the productivity gap, as it significantly increases the efficiency of production.

### 1.1 ICT's contribution to productivity

The share of ICT output in total UK GDP has been rising fairly steadily but still only reached 3% by 1998. Despite this, the growth of ICT output has contributed about a fifth of GDP growth from 1989 to 1998, making it the key contributor to GDP growth. On the input side,

since 1989, 55% of capital deepening (increasing the capital intensity by investing in new physical assets) has been contributed by ICT capital investment. From 1994 to 1998, investment in ICT capital accounted for a remarkable 90% of capital deepening. ICT capital deepening accounted for 25% of the growth of output per hour (productivity) in 1989-98 and 48% in 1994-98[1]. This huge contribution shows that ICT investment is driving the augmentation of capital intensity, which has been highlighted as the major reason for the productivity gap with Germany and France, and a significant cause of the gap with the US.

**1.2 International Comparison – US ICT contribution**

An interesting comparison to these figures comes with the US. US productivity growth, which was at a comparable level to the UK pre-1995, increased from an average of 1.5% per annum to 2.5% per annum between 1995 and 2000. Research indicates that ICT was responsible for up to 73% of this 1 percentage point (or 67%) increase[2]. Over the same period however, UK productivity growth has not been as impressive. This is likely to be due firstly to the increased proportion of ICT contribution to US productivity growth – 73% in the US compared to 48% in the UK over a similar period - (US also has a higher level of ICT output in GDP), but also to the contribution of tfp growth, which has been poor in the UK, but far superior in the US.

This could be accounted for by better tfp in the computer output business in the US, but also by special conditions in UK manufacturing, such as the strong pound, as tfp slowdown was far more pronounced in manufacturing than in other sectors[3]. Either way, the significance of ICT is proven by the fact that it consistently contributed to productivity growth in both economies, irrespective of the relative level of productivity growth. The table below (Table 1) presents an indication of the importance of the ICT sector to the American economy, showing that the sector's growth contribution far outweighs its size:

Table 1: Size and growth contributions of major US sectors
From Information Technology Industry Council[4]

| Industry | Size (% of GDP) | Average Growth Contribution 1994-9 | Ratio of Sector Size to Contribution |
|---|---|---|---|
| ICT | 8.2 | 29% | 3.5 |
| Transportation | 8.4 | 10% | 1.2 |
| Retail Trade | 9.2 | 14% | 1.5 |
| FIRE* | 19.3 | 20% | 1 |
| Services | 21.4 | 21% | 1 |

* Fire denotes Finance, Insurance and Real estate

**1.3 ICT investment: An important driver for growth**

Recent world economic conditions have shown that the ICT sector is not immune to cyclical downturns. Nevertheless, the OECD states, "all the evidence suggests that ICT remains a major positive dynamic force in OECD countries"[5]. It cites three main areas in which ICT affects economic growth: Through production, through investment, and through increased efficiency and innovation. It has been illustrated that the first two areas are very important, as an ICT-producing sector and capital deepening are important contributors to productivity growth. The efficiency and innovation part of ICT contribution is the key in this instance. To begin with, the effect on tfp is evident in countries like the US and Australia – amongst the highest ICT investors - who have seen massive overall productivity jumps. More specifically,

[1] Above figures all obtained from: ICT and Productivity Growth in the United Kingdom, Nicholas Oulton (2001)
[2] From Information Technology Industry Council (2001), link: www.itic.org/policy/tax_produc.htm
[3] ICT and Productivity Growth in the United Kingdom, Nicholas Oulton (2001)
[4] link: http://www.itic.org/policy/tax_growth.htm
[5] Seizing the Benefits of ICT in a Digital Economy, OECD (2003)

the use of ICT can help firms expand their product range, customise their services, or respond better to demand, all of which are indicative of innovation (see case study 3).

Case Study 3 – Customer Relationship Management (CRM)

"Home services giant Centrica is spending £450m on customer relationship management (CRM) projects for its British Gas and AA subsidiaries. The two initiatives are expected to achieve annual savings of more than £100m.

The largest system is at British Gas, with a £350m budget. The project covers nearly 12.8 million gas and 6 million electricity users and will provide 12,000 customer service staff with instant access to detailed information about client accounts. Some 5,000 employees are already using part of the system.

'We think this improvement in service will make it easier to retain existing customers as well as attract new ones,' said Paul Bysouth, director in charge of the CRM project. 'It will mean reduced customer acquisition costs, lower customer churn rates, and reduced operational costs as well as allowing customer service people more time to spend on providing support and offering additional products to our customers.'

'The real benefit of our investment will be from the difference it makes to our relationship with customers - they will be able to deal with us more quickly and easily,' said Bysouth. 'They will need to make only one call to us to cover their different accounts - such as gas, electricity, telecoms and home servicing.'

"Centrica Commits £450m to CRM plan", from Computing (5 June 2003)

The network effects of ICT investment are huge, leading to lower transaction costs, and hence higher innovative capability. This has direct implications for cluster formation, which has been identified as a key characteristic for an "Innovation-Driven" or "Knowledge Driven" Economy. The formation of high quality clusters is reliant on the interaction between key players in the market. ICTs enhance creative interaction, not only among scholars and scientists but, equally, among product designers, suppliers and the end customers[6].

With ICT investment, users of ICT can make these investments more valuable through their own experimentation and innovation. The OECD terms this as "co-invention" and economically, it can be described as a General Purpose Technology (GPT). GPTs are technologies that share four characteristics: a wide scope for improvement, applicability across a broad range of uses, potential for use in a wide variety of products and processes, and strong complementarities with existing or potential new technologies[7]. Essentially then, ICT is an "enabling technology". This is highlighted when comparing the ICT revolution to the onset of electronics in the production process in the early 20th century, and the argument is succinctly summarised in the following quotation:

> *"Most GPTs play the role of 'enabling technologies', opening up new opportunities rather than offering complete, final solutions. For example, the productivity gains associated with the introduction of electric motors in manufacturing were not limited to a reduction in energy costs. The new energy sources fostered the more efficient design of factories, taking advantage of the newfound flexibility of electric power. Similarly, the users of microelectronics benefit from the surging power of silicon by wrapping around the integrated circuits their own technical advances. This phenomenon involves what we call 'Innovational complementarities', that is, the productivity of R&D in a downstream sector increases as a consequence of innovation in the GPT technology. These complementarities magnify the*

[6] Economic Fundamentals of the Knowledge Society, P. A. David and D. Foray (2002)
[7] General Purpose Technologies and Surges in Productivity: Historical Reflections on the Future of the ICT Revolution, P.A. David and G. Wright (1999)

*effects of innovation in the GPT, and help propagate them throughout the economy."*[8]

ICT is most certainly an "enabling technology", which exponentially increases its applicability in the innovation process. Because of this, ICT has implications for every stage of the business process, from the creative spark (an invention) right through to the commercialisation and marketing stage. Some of the most important ICT innovations are done within a firm's operating process, giving it a competitive advantage, and hence improving productivity.

Case Study 4 – Broadband an "enabling technology" – The Korean Example

Many economists continue to predict significant macroeconomic benefits from the proliferation of broadband networks and pervasive broadband access, which has long been the missing link in the IT revolution. These predictions have driven a number of governments around the world to act and to prioritise broadband deployment as a matter of government policy. The BSG continues to believe that broadband has real potential to accelerate the five key drivers of economic growth: enterprise; innovation; competition; investment and skills[9].

In April 2002, the Korean government announced a series of loans totalling 80 billion KRW (US$60 million) TO Korean ISPs to increase the number of homes passed by broadband from 55% of Korean homes to 70% by the end of 2002.

As of 11/2002, the South Korean government reported 10M broadband users, over 68% of Korea's 14.5M households. By comparison, approximately 16% of 106M US households now have broadband access. Major suppliers include Korea Telecom 4.58M (DSL), Hanaro Telecom 2.86M (mostly DSL, some cable modem), and ThruNet 1.3M (cable).[10]

The Broadband Stakeholder Group and the government have set out several steps towards achieving a similar level of broadband penetration as South Korea, who have the highest global broadband penetration level.

### 1.4 ICT and labour force skills

After identifying the ways in which ICT can boost the tfp and capital intensity portions of productivity, it is possible to show that it can also aid in the labour force skills section, particularly within companies. e-learning is now commonplace in many firms and institutions around the global economy, and allows greater knowledge accumulation at a faster rate and a lower cost. This is evident in case study 5.

Case Study 5 – Honda Goes Online to Drive Training

"Honda is introducing online learning software to provide training for its dealership networks. The software will replace a 10-year-old bespoke application and allow Honda Institute, the company's training division, to manage the qualifications, training histories and personal development plans of thousands of Honda dealership employees.

Andy Smith, systems development manager at Honda Institute, said the new system would make it easier to hit its target of providing 12,000 annual man-days of commercial and technical training in the UK alone. "Our vision is to allow our dealers and large customers to book themselves onto training courses over the internet," Smith said.

Implementation of the core LMS, allowing Honda to administer classroom-based and distance learning courses, is due to be complete by September. Phase two will open up access to the system to dealerships. A pilot will be run later this year with full roll-out in 2004.

[8] General Purpose Technologies and Surges in Productivity: Historical Reflections on the Future of the ICT Revolution, P.A. David and G. Wright (1999)
[9] BSG Second Annual Report and Strategic Recommendations (2002)
[10] PDS Consulting Short Paper – Korea Broadband (2003)

Ultimately the system will be used to offer e-learning content developed both in-house and by third-party specialists. Honda hopes that e-learning will account for 10 per cent of its training by 2006. "Taking a more structured approach will also allow us to track training and update our records so we can make sure all people are trained for the job role they do. Currently there's no easy way of tracking it and we can't be as responsive on training," Smith said. He admitted that cost-cutting is high on the agenda, but maintained that customers would also benefit."

"Honda goes online to drive training", from Computing (5 June 2003)

ICT is an important element in tfp and a key General Enabling Technology effecting productivity in all areas, including labour market productivity. Implementation, take up and successful exploitation of ICT is key to UK's aim to raise productivity and bridge the gap between competing nations.

**Intellect therefore recommends that the Productivity Indicators contain a set of measures to ascertain UK's progress in implementation, take up and successful exploitation of ICT over and above the indicators contained within the consultation paper.**

## 2. The need for Communications Infrastructure indicators

The consultation paper sets the following question:

**Page 26 Question 3.1**
"Do you agree that a focused set of investment indicators should cover the following areas: investment environment for business, investment rates in the economy and investment in infrastructure? Are there any other areas that should be captured?"

Focusing on "Investment in infrastructure":

**Page 26 3.6** states "Infrastructure investment may be particularly important for complimenting private sector investment and boosting productivity."

This is complimented by the statement **Page 29 3.14** "Business investment directly impacts on the amount of capital and technology available to each worker, and is strongly correlated with productivity growth.".

However, Infrastructure is not defined within the document per se, but is referred to in terms of transport infrastructure:

**Page 32 3.21** states "one area where government investment can directly influence productivity is through improvements to infrastructure. For example, good transport infrastructure, such as effective roads, railways an airports, can improve productivity by lowering transport costs, permits greater specialisation and economies of scale…"

The consultation also suggests using The Department for Transport's estimates of public and private transport spending in the UK (**Page 33 3.25**) as an alternative to the Global Competitiveness Report's information on infrastructure. This also indicates that Infrastructure only relates to transport infrastructure.

This measurement does not reference communications infrastructure, omitting to recognise its importance. Communications Infrastructure is essential to support and promote technological investment (and therefore increases in new physical capital and total factor productivity).

– An available, high functioning communications infrastructure is an essential factor in business investment decision making.

- There is also an impact on the Government's ability to invest in services (lack of communications infrastructure will limit the delivery of services and efficiency of services to citizens, impacting quality of life which "indirectly effects on productivity and the attractiveness of the UK as a location to live, work and invest" (**Page 31 3.16**)).
- It is also essential for facilitating innovation being key to information sharing and also for stimulating consumer demand.

Without focusing on the communications infrastructure the UK will be lacking in one of the key components within the UK's drive to raise productivity.

**Intellect recommends a revision of the indicators to ensure that infrastructure criteria includes communications infrastructure.**

## 3. Comments on criteria and methodology for selecting the set of indicators

This section includes Intellect thoughts and comments on criteria and methodology for selecting the set of indicators as a contribution towards current thinking.

3.1 **Page 3 Foreword** "In 1999 the Department of Trade and Industry developed a set of 'UK Productivity and Competitiveness Indicators'. These indicators have…. Significantly contributed to the wider debate on how to ensure the UK makes the transition to a more innovative, enterprising economy"

"..it is possible to track the effectiveness of the Government's productivity strategy by focusing on the drivers of productivity and identifying key leading indicators of productivity performance. Hence Government is considering identifying a more focussed and stable set of national productivity indicators…. This should allow changes in performance to be identified an provide an early warning of where policy action is needed."

Measures are set up to track productivity performance and decide on areas for current and future investment, Government focus and policy development. Intellect supports the understanding that it is therefore essential to get the indicators right, and the supporting policy structure responsive.

**3.2 Page 3 Foreword "**In keeping with the current set of DTI indicators, the more focused set would be based on data that is already publicly available."

In response to this point, Intellect asks, What if the data that is already publicly available does not provide the measures needed to track the UK's transition to a "more innovative, enterprising economy"? We need to measure progression into new areas and it is worth examining if this requires new measurements.

**3.3 Page 5 A more focused set of productivity indicators** "Making the transition to a more productive economy is a long-term process. Consequently, when assessing productivity it is useful to look for changes in the underlying factors driving productivity growth…".

It is good that Government is re-assessing drivers, however, in referring to point 3.2, surely if we are re-assessing measures needed then we should be open to the possibility of new measurement requirements?

**3.4 Page 9 1.1 Introduction** "In the long term, it is only increases in productivity that can raise wages, profits and ultimately overall prosperity… If the UK is to grow and maintain relative living standards then it needs to address the long-standing structural problems that stop the UK from using all of its available resources effectively"

Intellect puts forward that the UK also needs to anticipate new issues that could develop into future "long standing structural problems" if they are not invested in now (for example omitting

to measure implementation, take up and successful exploitation of ICT as a driver for productivity.).

**3.5 Page 10 1.3** "The Government's key focus is on improving living standards. Therefore, labour productivity is used as the central measure of productivity performance as it is closely related to earnings and economic welfare."

How is labour productivity measured/defined in its detail? Is it is based on product or asset based productivity, or does it take into account service/high value add related labour productivity? With a market where service based outputs are growing, it is essential to measure these productivity outputs to ensure a realistic understanding of UK productivity.

**3.6 Page 18 1.18** Regarding 'Current Purchasing Power Parity' approach "However, one disadvantage of this approach is that it relies on the availability of PPPs, which appear with a lag. PPPs are subject to routine revision of up to two years after the year in which data were collected;"

Intellect asks, is it not possible to update PPPs more regularly rather than create a new methodology to compensate (Constant Purchasing Power Parity approach) which also has data inaccuracy issues?

**3.7 Page 22 Question 2.1** "Do you agree that a more focused set of national productivity indicators is desirable to assist the Government with monitoring progress towards the productivity Public Service Agreement target?"

Metrics are essential to measure 'where we are now' and also to predict where investment is required to meet set targets. A focused set of national productivity indicators would be desirable depending that we choose the best indicators to measure against UK needs and vision. It is essential that we do not rely on information at hand, but actively work to develop information needed – therefore, not relying on past measurements, but attain measurements reflecting today and identifying needs for tomorrow.

**4 Page 22 2.4** "A set of criteria has been identified… These are based on Office for National Statistics guidance….

Comparability: The indicator is based on data that is available over time and for other countries as well as the UK to permit progress in the UK's performance to be compared…"

Intellect is concerned that these criteria could act to hamper UK's performance and USP. If the UK identifies a critical issue to UK development, yet it is not measured internationally, should that prevent us from benchmarking our own performance in that area? In the private sector, if a company only measured itself against other company's indicators, it would prevent innovation and competition. The UK should select indicators with a focus on UK development, including any that may be competitive differentiators – even if other countries are not.

"Reliability:…exists in the public domain, and is expected to continue to be published in the foreseeable future."

It should be essential to identify what needs to be measured, rather than relying on what is measured. If new influences on productivity are not currently being measured then Intellect puts forward that it would be expedient to revise data gathering rather than rely on old metrics.

## Annex A

The consultation document "Productivity in the UK 5: Benchmarking UK productivity performance" refers throughout to technology in relation to productivity, showing recognition of the key impact ICT has on productivity. The following references have been identified:

**Page 13 Box 1.2**
"… total factor productivity (tfp) attempts to measure output per unit of inputs, where inputs are generally labour an capital. It measures how efficiently capital and labour are used together and captures a range of factors such as skills, technology, organisation, competition and economies of scale. In principle this is a more appealing measure of an economy's efficiency…"

**Page 21 2.2**
"The Government has identified 'five drivers' of productivity…supporting science and innovation, to promote the development of new technologies and more efficient ways of working"

**Page 25 3.1**
"Physical capital is an essential determinant of economic growth and productivity…Investment in new capital is also one way of incorporating new technology into the production process, improving firm efficiency"

**Page 26 3.3, 3.4, 3.5**
3.3 "The amount of physical capital in an economy has long been recognised as a central driver of economic growth, and numerous empirical studies have assessed the importance of physical capital to growth…"
3.4 "New investment is required to replace, update and increase the capital stock. This investment impacts on productivity growth and levels through two channels: capital deepening; and incorporating new technology."
3.5 "…Technological advances can also be brought into the production process through new physical capital. Providing that the wider environment supports innovation – that workers are equipped with the relevant skills to take advantage of new equipment, for example – new physical capital should lead to both an increase in labour productivity and total factor productivity (tfp)."

**Page 29 3.14**
"Business investment directly impacts on the amount of capital and technology available to each worker, and is strongly correlated with productivity growth."

**Page 35 Innovation Overview**
"Productivity growth relies on a continual stream of innovative technologies, new products and processes, as well as novel services and means of delivery.."

**Page 35 4.1**
"Innovation – the successful exploitation of new ideas – is one of the main engines of long-term economic growth. It can result in new technologies, new products and processes, as well as novel services and means of delivery.

**Page 36 Box 4.1**
"…The DTI's innovation Report identifies a small number of 'critical success factors' that determine the strength of innovation systems….Sources of new technological knowledge – new knowledge, resulting from investments in science, technology engineering and design has an important role in shaping innovation systems."

**Page 37 4.4**
"The DTI's recent Innovation Report reveals that a wide variety of factors influence the ability of an innovation system to generate innovation and economic growth… Key elements underpinning this driver are sources of new technological knowledge, and networks and collaboration…"

**Page 37 4.5**
“Successful innovation is founded on an economic environment that successfully: develops sources of new technological knowledge; builds networks and collaboration; and translates new ideas into a new product, process or service (innovation outcomes).

**Page 43 4.23**
“Networking plays a pivotal role in innovation, and increasingly so as technologies become more complex. Firms rarely innovate alone.

**Page 49 Skills Overview**
“Skills play a vital part in supporting productivity growth. Higher skill levels allow workers to generate new ideas, adapt to the changing economic environment and facilitate the implementation of new technology”.

**Page 49 5.1**
“Higher skills levels allow workers to generate ideas and adapt to the changing economic environment. Without access to a skilled workforce, firms are unable to implement new technology or affect organisational change.”

**Page 53 5.13**
“Technological change means that firms and workers wishing to retain their human capital need to invest in training throughout their working lives.”

**Page 71 7.10**
“Trade and foreign direct investment also generate wider benefits to the economy through knowledge spillovers, as domestic companies lean about new techniques and technologies from their international competitors”